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VLAHOS, SOPHIA	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/534,735	NIELSEN, JORGEN S	
	Examiner	**Art Unit**	
	SOPHIA VLAHOS	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 May 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-28* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12 May 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *5/9/07*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 3-5, 8, 10-11, 21-26 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claim 3, recites: “wherein the possible transitions and the probability of the paths are assigned to reflect properties of said receiver.” Paragraphs [0032]-[0033] and the Matlab code simulation of the specification (U.S. 2006/0034350) mention examples of possible probability assignments as shown in Fig. 2 and Fig. 3, but fails to disclose as how the examples of assigned probability assignments, reflect properties of the receiver.

Claim 4, specifies: “wherein the step of creating possible state transitions for each node is performed based on a known phase slew rate limitation of said receiver”. Again, the specification ¶ [0032]-[0033] and the Matlab code example do not provide an explanation/description of how a “phase slew rate limitation” of a receiver is used as a basis on creating the possible state transitions for each node.

Claim 5, recites: “ wherein the known slew rate limitation is calculated from the instability of a radio frequency local oscillator in said receiver.” However, the specification does not describe or explain any calculation of "the known phase slew rate limitation” much less a calculation based on the instability of a radio frequency local oscillator in aid receiver.

Claim 10 recites: “…and the known phase slew rate limitation is calculated from the uncertainty of the GPS SV Doppler shift.” However, the specification does not describe or explain any sort of calculation of "the known phase slew rate limitation”.

Claim 11 recites: “wherein the known phase slew rate limitation is calculated from both the instability of a radio frequency local oscillator in said receiver and the uncertainty of the GPS SV doppler." As mentioned above, the specification does not describe or explain any sort of calculation of "the known phase slew rate limitation”, much less a calculation based on an instability and an uncertainty as specified by claim 11.

Claim 8 - depending on claim 4 - is also rejected for at least the same reasons as claim 4 above.

Apparatus claims 21-26 recite limitations similar to the those of claims 3-5, 10-11 and are also rejected under a similar rationale to the one used to reject method claims 3-5, 10-11 above.

Claim Objections

3. Claim 1 is objected to because of the following informalities: Claim 1 recites (line 9 after the preamble): "…according said possible transitions..." that should be "…according **to** said possible transitions…" (emphasis added).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1, 3, 6, 12-15, 19, 27-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huff (U.S. 6,477,208) in view of Schoolcraft (U.S. 5,237,587) and Pekarich et al., (U.S. 6,633,615).

With respect to claim 1, Huff discloses: creating a trellis of evenly distributed phase state nodes at each time interval (see Fig. 3, trellis diagram, where the phase state nodes are the black dots (corresponding to 32 phase states labeled 0 through 31) and horizontal axis is a symbol time axis, column 12, lines 65-67, through column 13, lines 1-3), said creating step comprising: defining a plurality of phase states representing the phases evenly quantized over 0 to 360 degrees (see column 12, lines 65-67, through column 13, lines 1-5, where the states are offset to each other by 2π/32); defining possible state transitions from and to each phase state node (Fig. 3,

dashed lines between dots , see also Fig. 5A see dashed lines (trellis transitions) between phase state nodes, see column 16, lines 26-30); creating paths between phase state nodes in one time interval and phase state nodes according said possible state transitions (see Fig. 8 (or Fig. 6 since the CTP of Fig.8 includes the additional /optional “805” module), the composite trellis processor, calculation of distances (branch metrics) between allowed transitions at each phase state, see column 20, lines 21-41); assigning a transition probability to each path (this is the calculated branch metric, an indication of the likelihood of a particular transition occurring, and the branch metric is assigned as transition probability to each path); and creating a likelihood metric for each path based on a measured phase of the received signal and the transition probability for the path, (see Fig. 8 (or Fig. 6), see signal inputs to CTP including a modulation phase $\varphi_m(t)$ and an undesired phase component $\varphi_u(t)$, see column 11, lines 55-62 (Fig.8 is another embodiment of the CTP)) the likelihood metric corresponds to accumulated branch metrics, a path metric, see ACS module 804) said measured phase having a random process (see column 5, lines 12-19, see undesired signal phase estimates when the receiver has an additive Gaussian noise, its noise is a random process approximated as a Gaussian distribution); and utilizing a Viterbi algorithm on said trellis to perform a maximum likelihood estimation of a phase trajectory with said quantized resolution of phase states over 0 to 360 throughout the measurement time epoch (Fig. 6, column 13, lines 29-34, see multiplication by $2\pi/32$ (the quantized resolution of phase states over 0 to 360 degrees)).

Huff does not expressly teach: correlating said received signal with a local replica of a pseudo noise code in a coherent fashion over time intervals in said time epoch creating a correlation signal; said measured phase of the received signal having a random process approximated utilizing a discrete Markov process.

In the same field of endeavor (wireless communications), Schoolcraft discloses: correlating said received signal with a local replica of a pseudo noise code in a coherent fashion over time intervals in said time epoch creating a correlation signal (Fig. 2, see blocks 34, “512-chip correlator”, and 22 “PN coder”, column 6, lines 26-28, column 9, lines 30-34, every symbol interval (32 chips) corresponds to the claimed time interval and the time epoch corresponds to the reception mode time duration).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the system of Huff based on the teachings of Schoolcraft so that it becomes relatively immune to eavesdropping and jamming (by implementing a spread spectrum modulation/demodulation method as taught by Schoolcraft, column 1, lines 1-9, 17-22, column 2, lines 14-34).

In the same field of endeavor, Pekarich et. al., disclose: a received signal having a random process approximated utilizing a discrete Markov process (see column 1, lines 32-38, description of a ML detector, where the received sequence is a finite-state, discrete time Markov process).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art, to approximate the received phase of Huff, as a maximum likelihood detector provides a maximum a posteriori estimate of a discrete-time Markov process

observed in noise (and the viterbi algorithm is reduced to a summation of conditional probabilities).

With respect to claim 3, Huff discloses: wherein the possible state transitions and the probability of the paths are assigned to reflect properties of said receiver (the possible state transitions and probabilities (of the trellis diagrams of Fig. 3 and/or Fig. 5A reflect the modulation type used by the receiver).

With respect to claim 6, the system obtained by modifying Huff based on Schoolcraft, includes: wherein the received signal is a direct sequence spread spectrum signal (such a signal corresponds to a signal spread by a PN code, see Fig. 1, Fig. 2 of Schoolcraft, multiplication (i.e. spreading) by PN code blocks 22, and 16, column 1, lines 17-23).

With respect to claim 12, the system obtained by modifying Huff based on Schoolcraft includes: wherein the likelihood metric is created based on an approximation of a probability distribution function of the phase of said correlation signal (see column 5, lines 13-18, where the receiver adds noise approximated as having white and Gaussian distribution, therefore the likelihood metrics that are a function of the received signal (see Fig. 8), are created based on an approximation of a probability function of the phase (part of received information)).

With respect to claim 13, Huff further discloses: wherein the approximation is to model the probability function of the phase as a periodic Gaussian pulse on top of a constant function (column 5, lines 13-18 where white and Gaussian noise, is a (periodic) Gaussian type distribution on top of a close to zero constant function).

With respect to claim 14, Huff discloses: wherein said receiver is a mobile receiver (see column 11, lines 60-62 the CTP is part of receive terminal, a mobile receive terminal, see column 38-48).

Apparatus claims 15, 19, 27-28 recite specific components used to perform the steps of method claims 1, 14, 12-13 respectively and are rejected based on a similar rationale.

6. Claims 2, 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huff (U.S. 6,477,208) in view of Schoolcraft (U.S. 5,237,587) and Pekarich et al., (U.S. 6,633,615) as applied to claims 1 & 15 respectively, and further in view of Bruno et al., "Design and Evaluation of a Soft Output Viterbi Algorithm (SOVA) for use in a Concatenated Coding Scheme", (October 16, 2001).

With respect to claim 2, neither Huff, Schoolcraft, nor Pekarich et al., expressly teach: wherein the Markov process is a first order Markov process.

In the same field of endeavor (viterbi decoders), Bruno et al. disclose: a first order Markov process (page 7, see first half of page, specifically sentence prior to equation [2], see first order Markov equation).

At the time of the invention it would have been obvious to a person of ordinary skill in the art to modify the system of Huff as modified by Schoolcraft and Pekarich et al. based on the teachings of Bruno et al. so that the Viterbi algorithm is reduced to a summation of conditional probabilities (see equation [2] on page 7 of Bruno et al.).

7. Claims 7, 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huff (U.S. 6,477,208) in view of Schoolcraft (U.S. 5,237,587) and Pekarich et al., (U.S. 6,633,615) as applied to claims 1 & 15 respectively, and further in view of Lennen (U.S. 6,404,801).

With respect to claim 7 neither Huff, Schoolcraft, nor Pekarich et al., expressly teach: wherein the received signal is a global positioning (GPS) coarse/acquisition L1 signal generated by a space vehicle (SV).

In the field of wireless communications (GPS), Lennen discloses: wherein the received signal is a global positioning (GPS) coarse/acquisition L1 signal generated by a space vehicle (SV) (see column 1, lines 42-51 where it is understood that a GPS receiver, receives the mentioned transmitted signals from the GPS satellites (space vehicles)).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the system of Huff based on the teachings of Lennen so that it

processes GPS signals such as the L1 signal so that it is capable to accurately determine its the location and/or time (Lennen, column 1, lines 15-22).

With respect to apparatus claim 17, claim 17 is rejected based on a rationale similar to the one used to reject method claim 7 above.

8. Claims 9 ,18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huff (U.S. 6,477,208) in view of Schoolcraft (U.S. 5,237,587) and Pekarich et al., (U.S. 6,633,615) as applied to claims 1 & 15 respectively and further in view of Lucas (U.S. 5,448,600).

With respect to claim 9, neither Huff, Schoolcraft, nor Pekarich et al., expressly teach: wherein the received signal is a code-division multiple access (CDMA) pilot signal.

In the same field of endeavor, Lucas discloses: wherein the received signal is a code-division multiple access (CDMA) pilot signal (see column 4, lines 52-56, CDMA pilot).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the system of Huff based on the teachings of Lucas, so that at the receiver an estimate of the channel response is obtained (based on the received CDMA pilot signal, (Lucas, column 4, lines 52-55).

9. Claims 20-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huff (U.S. 6,477,208) in view of Schoolcraft (U.S. 5,237,587) and Pekarich et al., (U.S. 6,633,615) as applied to claims 15 above, and further in view of Cahn et. al., (U.S. 5,535,278)

With respect to claim 20, neither Huff, Schoolcraft, nor Pekarich et al., teach: wherein the known signal is a GPS C/A L1 signal.

In the same field of endeavor, Cahn et. al., discloses: wherein the known signal is a GPS C/A L1 signal (Fig. 3 GPS receiver, column 12, lines 52-61, column 11, lines 50-67).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the system of Huff based on the teachings of Cahn et al., so that it is used in satellite based GPS applications, that allow for precise determination of a location (Cahn et al., column 1, lines 37-43).

With respect to claim 21, claim 21 is rejected based on a rationale similar to the one used to reject method claim 3 above.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Adachi (U.S. 5,654,667)

Zeng et al., (U.S. 7,154,965)

Cooper (U.S. 5,375,129)

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SOPHIA VLAHOS whose telephone number is (571)272-5507. The examiner can normally be reached on MTWRF 8:30-17:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammed Ghayour can be reached on 571 272 3021. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/SOPHIA VLAHOS/
Examiner, Art Unit 2611
4/2/2008

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